

CLAIMS

Having thus described the preferred embodiment, the invention is now claimed to be:

1. A cooling system (12) for use with an associated x-ray tube assembly (10) comprising:

a heat exchanger (12, 14) which receives cooling fluid from a housing (40) of the associated x-ray tube assembly and transfers heat between the cooling fluid and a flow of air;

a fan (90) disposed to move the flow of air through the heat exchanger; and

an air flux director (110) positioned to intercept the flow of air from the heat exchanger and to redirect the flow of air in a direction which is generally perpendicular to an axis of rotation of the fan.

2. The cooling system of claim 1, wherein the fan is an axial fan.

3. The cooling system of claim 1, wherein the air flux director defines a truncated cone with a concave outer surface (113).

4. The cooling system of claim 1, wherein the air flux director is spaced from the fan along the rotational axis of the fan.

5. The cooling system of claim 4, wherein the air flux director is aligned with the rotational axis of the fan.

6. The cooling system of claim 1, wherein the fan is positioned intermediate the heat exchanger and the air flux director.

7. The cooling system of claim 6, wherein the fan includes blades (94) which have a diameter which is less than a maximum outer diameter of the air flux director.

8. The cooling system of claim 6, wherein the fan includes a motor (91), the motor being mounted to the air flux director.

9. The cooling system of claim 1, further including a duct (78) which receives air from the heat exchanger and diminishes in cross section toward the air flux director.

10. The cooling system of claim 9, wherein the fan includes radial blades (94) which are positioned within the duct.

11. The cooling system of claim 10, wherein the air flux director defines a truncated cone with a concave outer surface (113), the duct, the fan blades, and the air flux director being coaxial.

12. The cooling system of claim 1, further including:

a second heat exchanger mounted in parallel with the first heat exchanger;

a second fan disposed to move a second flow of air through the second heat exchanger; and

a second air flux director positioned to intercept the second flow of air from the second heat exchanger and redirect the second flow of air in a direction which is generally perpendicular to an axis of rotation of the second fan.

13. The cooling system of claim 12, further including:

at least a first air flux separator (140), positioned intermediate the first and second air flux directors, to reduce turbulence created by intermixing of the first and second flows of air.

14. The cooling system of claim 13, wherein the first and second air flux directors are mounted back-to-back.

15. The cooling system of claim 13, further including:

a second air flux director which defines a truncated cone with a concave outer surface;

a second duct; and

a second fan, fan blades of the first and second fans, the first and second ducts, and the first and second air flux directors being coaxial.

16. An assembly comprising:

an x-ray tube (32) mounted in a housing (40);

the cooling system (12) of claim 1; and

a pump (52) which circulates the cooling fluid through the housing and the cooling system of claim 1.

17. The assembly of claim 16, wherein the x-ray tube has a power input of at least 4.5KW.

18. A CT system (200) comprising:

a gantry (210) mounted for rotation about a gantry axis;

an x-ray tube (32) mounted in a housing (40);

the cooling system (12) of claim 1; and

a pump (52) which circulates the cooling fluid through the housing and the cooling system of claim 1 supported by the gantry; and,

an array (218) of x-ray detectors mounted to the gantry opposite to the x-ray tube.

19. An x-ray tube assembly and cooling system comprising:

an x-ray tube (32) for generation of x-rays;

a fluid flow path (46) which carries heated cooling fluid from the x-ray tube (32) and returns cooled fluid to the x-ray tube; and

a cooling system (12) including:

an axial fan (90) which is disposed to move a stream of air past a portion of the flow path, the fan having an axis of rotation; and

an air flux director (110) axially spaced from the fan and shaped to radially deflect air exhausted by the fan.

20. A method for cooling an x-ray tube assembly (10) comprising:

receiving a heated cooling liquid from the x-ray tube assembly through a fluid flow path;

transferring heat between the cooling liquid and a flow of air generated by a fan (90), the fan exhausting the air flow in a direction generally parallel with its axis of rotation;

deflecting the exhausted air in a radial direction which is generally perpendicular with the axial direction